Extreme Networks Jumpstart Deployment Guide

Using ExtremeXOS, NetSight, and NAC on BlackDiamond X8, BlackDiamond 8K, and Summit Family Switches

Abstract: This document provides a jumpstart perspective on how to deploy basic services on ExtremeXOS and NetSight with Network Access Control (NAC), and provides examples of basic commands for getting started. The sections discussed are basic setup, forwarding, administration, and using ExtremeXOS with NetSight and NAC.

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Introduction

This document provides a jumpstart for bring-up of Extreme Networks BlackDiamond® X8 and BlackDiamond® 8K and Summit series switches with NetSight® and Network Access Control (NAC).

This guide is intended for the IT administrator deploying and managing the network, who is very familiar with the feature concepts but new to the ExtremeXOS software, NetSight, and NAC. This guide is a jumpstart on the basic capabilities for management and forwarding, and is not intended to be comprehensive. You should complement this guide with the full concepts and configuration documentation available from the Extreme technical documentation web page at: www.extremenetworks.com/documentation/

Prerequisites

Switch

The switch is online and the following are completed as described in the *Quick Start Guide* shipped with the product:

1. The physical switch is properly installed.
2. You have connectivity to the switch via the console port.

NetSight Management System

NMS is online and the following are completed as described in the NetSight installation and configuration documentation:

1. NetSight application version 6.1 or higher is properly installed.
2. You have IP connectivity to the NMS and can bring it up in a web browser.

NAC

NAC is online and the following are completed as described in the NetSight installation and configuration documentation:

1. NAC application is properly installed.
2. You have IP connectivity to the NAC.

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Basic Bring-up

Console and Management Port

For the console port, the terminal or terminal emulator should have the settings **9600/8/N/1** (9600 baud, 8 data bits, 1 stop bit, no parity, ON/OFF flow control enabled).

By default the management port is in the “Mgmt” VLAN in the “VR-Mgmt” VR, and administrators use it for management-related traffic, including IP connectivity to the switch, syslog server, RADIUS server, NTP server, etc. You should configure the “Mgmt” VLAN with an IP address and add a default route to the gateway.

1. Configure the IP address and subnet mask for the “Mgmt” VLAN. Then configure the default gateway, specifying “VR-Mgmt” virtual router (VR).

   Examples:

   configure vlan Mgmt ipaddress 10.65.1.100 255.255.255.0
   configure iproute add default 10.65.1.1 vr VR-Mgmt

2. Verify the management configuration using show commands:

```
X770_ToR_1.2 # show vr "VR-Mgmt"
Virtual Router        : VR-Mgmt                  Type : System
Description           : Management VR
Operational State     : Up
IPv4 Admin State      : Enabled     IPv6 Admin State   : Enabled
IPv4 Route Sharing    : Disabled    IPv6 Route Sharing : Disabled
VLANs                 : Mgmt
Virtual Router Totals :
Total Protocols       :     0    Max Protocols         :     8
Total Ports           :     0
Total VLANs           :     1
Total IPv4 VLANs      :     1    Total IPv6 VLANs      :     0
Active IPv4 VLANs     :     1    Active IPv6 VLANs     :     0
Inactive IPv4 VLANs   :     0    Inactive IPv6 VLANs   :     0
```

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```
X770_ToR_1.2 # show vlan "Mgmt"
VLAN Interface with name Mgmt created by user
    Admin State:         Enabled     Tagging:   802.1Q Tag 4095
    Description:         Management VLAN
    Virtual router:      VR-Mgmt
    IPv4 Forwarding:     Disabled
    IPv4 MC Forwarding:  Disabled
    Primary IP:          10.65.1.100/24
    IPv6 Forwarding:     Disabled
    IPv6 MC Forwarding:  Disabled
    IPv6:                None
    STPD:                None
    Protocol:            Match all unfiltered protocols
    Loopback:            Disabled
    NetLogin:            Disabled
    OpenFlow:            Disabled
    TRILL:               Disabled
    QosProfile:          None configured
    Flood Rate Limit QosProfile:       None configured
    Ports:   1.           (Number of active ports=1)
     Untag: Mgmt-port on Mgmt is active
```

3. Verify that the device can ping the default gateway. Unless otherwise specified, ping presumes VR-Default, so the ping command will need to specify VR-Mgmt.

```
X770_ToR_1.2 # ping vr "VR-Mgmt" 10.65.1.1
Ping(ICMP) 10.65.1.1: 4 packets, 8 data bytes, interval 1 second(s).
16 bytes from 10.65.1.1: icmp_seq=0 ttl=64 time=0.985 ms
16 bytes from 10.65.1.1: icmp_seq=1 ttl=64 time=0.746 ms
16 bytes from 10.65.1.1: icmp_seq=2 ttl=64 time=0.811 ms
16 bytes from 10.65.1.1: icmp_seq=3 ttl=64 time=1.009 ms

--- 10.65.1.1 ping statistics ---
4 packets transmitted, 4 packets received, 0% loss
round-trip min/avg/max = 0/0/1 ms
X770_ToR_1.3 #
```

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Navigating the CLI

You should now be able to telnet to the switch through the management port and log in.

1. Log in using the username 'admin' with no password (press **Enter** at “password:”).
2. Press the **Tab** key to display all the commands at the root level of the CLI (e.g., ‘show’). Once you enter 'show', again press **Tab** (once or twice) to see the next level of commands under the 'show' directory/level.

Validating Connectivity

You can verify basic system and connectivity on the switch through Extreme Discovery Protocol (EDP) which is enabled by default. Validate that the ports on the local Extreme switch are connected to the expected ports on the remote Extreme switch.

To begin, start with these commands. The outputs below are captured from switches with already some configurations. This switch x770_ToR_1 is connected to x670_ToR_2 via port 41, 42, 43, 44, and connected to BDX8_Agg_1 via port 49, 53, and connected to BDX8_Agg_2 via port 57, 61. There is one Default VLAN and one Mgmt VLAN and several user-defined VLANs (red, blue, ISC, iSCSI_1, iSCSI_2, holding).

```
show edp
show vlan
```

```
* X770_ToR_1.1 # show edp ports all

Port   Neighbor                    Neighbor-ID         Remote  Age    Num
                                                        Port        Vlans
================================================================================
41     X670_ToR_2                00:00:00:04:96:8f:cd:5b   1:41   54     3
42     X670_ToR_2                00:00:00:04:96:8f:cd:5b   1:42   21     3
43     X670_ToR_2                00:00:00:04:96:8f:cd:5b   1:43   34     3
44     X670_ToR_2                00:00:00:04:96:8f:cd:5b   1:44   40     3
49     BDX8_Agg_1                00:00:00:04:96:6d:79:8a   5:1    24     2
53     BDX8_Agg_1                00:00:00:04:96:6d:79:8a   5:5    28     2
57     BDX8_Agg_2                00:00:00:04:96:7d:d5:8c   5:1    42     2
61     BDX8_Agg_2                00:00:00:04:96:7d:d5:8c   5:5    44     2
================================================================================
```

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```
* X770_ToR_1.4 # show vlan
-------------------------------------------------------------------------------------------------
Name            VID  Protocol Addr       Flags                        Proto  Ports  Virtual
                                                                             Active router
                                                                             /Total
-------------------------------------------------------------------------------------------------
blue            1000 ------------------------------------------------- ANY    2 /6   VR-Default
Default         1    ------------------------------------------------- ANY    0 /0   VR-Default
holding         4093 ------------------------------------------------- ANY    0 /0   VR-Default
ISC             10   192.168.1.1    /30  ------I---------------------- ANY    1 /1   VR-Default
iSCSI_1         11   ------------------------------------------------- ANY    0 /0   VR-Default
iSCSI_2         12   ------------------------------------------------- ANY    0 /0   VR-Default
Mgmt            4095 10.65.1.100    /24  ----------------------------- ANY    1 /1   VR-Mgmt
red             1001 ------------------------------------------------- ANY    2 /6   VR-Default
-------------------------------------------------------------------------------------------------
Flags : (B) BFD Enabled, (c) 802.1ad customer VLAN, (C) EAPS Control VLAN,
        (d) Dynamically created VLAN, (D) VLAN Admin Disabled,
        (e) CES Configured, (E) ESRP Enabled, (f) IP Forwarding Enabled,
        (F) Learning Disabled, (h) TRILL Enabled, (i) ISIS Enabled,
        (I) Inter-Switch Connection VLAN for MLAG, (k) PTP Configured,
        (l) MPLS Enabled, (L) Loopback Enabled, (m) IPmc Forwarding Enabled,
        (M) Translation Member VLAN or Subscriber VLAN, (n) IP Multinetting Enabled,
        (N) Network Login VLAN, (o) OSPF Enabled, (O) Flooding Disabled,
        (p) PIM Enabled, (P) EAPS protected VLAN, (r) RIP Enabled,
        (R) Sub-VLAN IP Range Configured, (s) Sub-VLAN, (S) Super-VLAN,
        (t) Translation VLAN or Network VLAN, (T) Member of STP Domain,
        (v) VRRP Enabled, (V) VPLS Enabled, (W) VPWS Enabled, (Z) OpenFlow Enabled

Total number of VLAN(s) : 8
* X770_ToR_1.5 #
```

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Configuration and Image Management

Administrators can view basic information about the switch including the full configuration, switch details, and software version. In addition, see the Integrated NetSight and NAC section (on page 26) to view information on how to get information on the switches from centralized management system.

1. View system configuration on the EXOS switch.

   Use the commands:

   show configuration
   show switch
   show version

```
X770_ToR_1.4 # show switch

SysName:          X770_ToR_1
SysLocation:      SAI Solutions Lab RDU
SysContact:       Yeva Byzek (yeva@extremenetworks.com)
System MAC:       00:04:96:97:E1:35
System Type:      X770-32q

SysHealth check:  Enabled (Normal)
Recovery Mode:    All
System Watchdog:  Enabled

Current Time:     Mon Sep 15 09:48:34 2014
Timezone:         [Auto DST Enabled] GMT Offset: -300 minutes, name is EST.
                  DST of 60 minutes is currently in effect, name is not set.
                  DST begins every second Sunday March at 2:00
                  DST ends every first Sunday November at 2:00

Boot Time:        Fri Sep  5 14:47:51 2014
Boot Count:       4
Next Reboot:      None scheduled
System UpTime:    9 days 19 hours 42 seconds

Current State:    OPERATIONAL
Image Selected:   secondary
Image Booted:     secondary
Primary ver:      15.4.0.47
Secondary ver:    15.5.2.9

Config Selected:  primary.cfg
Config Booted:    primary.cfg

primary.cfg       Created by ExtremeXOS version 15.5.2.9
                  961724 bytes saved on Fri Sep 12 12:57:26 2014

X770_ToR_1.5 # show version
Switch      : 800534-00-03 1403G-00063 Rev 3.0 BootROM: 2.0.2.1    IMG: 15.5.2.9
PSU-1       : Internal PSU-1 800462-00-04 1412W-81141
PSU-2       : Internal PSU-2 800462-00-04 1412W-81138

Image   : ExtremeXOS version 15.5.2.9 v1552b9 by release-manager
          on Wed Jul 23 00:48:16 EDT 2014
BootROM : 2.0.2.1
Diagnostics : 6.3
```

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2. Manage the configurations and images using the commands:

   save configuration
   use image primary
   download image
   unconfig switch all

3. Reboot the system by typing **reboot**.

Basic Forwarding

This section is meant to be a starting point and represents only a tiny subset of the functionality and options within EXOS. Please refer to ExtremeXOS documentation on the Extreme documentation page for full descriptions.

Data Ports

By default, all ports are enabled and in the “Default” VLAN in the “VR-Default” VR, without any Layer 2 protocol to prevent loops.

1. Disable all ports and then enable only the used ports. For example:

   disable ports all
   enable ports 1-3,5,7

2. Configure per-port “display-string” that is displayed on each of the **show port** CLI commands, or “description-string” to modify SNMP alias. For example:

   configure ports 8 display-string foo-display-string
   configure ports 8 description-string "foo-description-string"

3. Configure the port speed. For example:

   configure ports 1 auto off speed 10000 duplex full

4. Configure LAG ports. For example:

   enable sharing 7 grouping 7-12,14 algorithm address-based L2 lacp
   enable sharing 49 grouping 49, 53 algorithm address-based L3_L4 lacp

5. Use the following show commands to view the ports status. To clear the counters in the show commands below, issue the command **clear counters**.

   show ports information
   show ports configuration
   show ports statistics
   show port sharing
   show l2stats
   show port rxerrors
   show port packet

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```
* X770_ToR_1.5 # show ports information
Port      Flags               Link      ELSM Link Num Num  Num   Jumbo QOS     Load
                              State     /OAM UPS  STP VLAN Proto Size  profile Master
================================================================================
ESXi      Emjla--oe--fMB---x- ready     - / -  0    0    2   0   9216  none    1 a
HyperV    Emjla--oe--fMB---x- ready     - / -  0    0    2   0   9216  none    2 a
Linux     Emjla--oe--fMB---x- ready     - / -  0    0    2   0   9216  none    3 a
Ixia      Emjla--oe--fMB---x- ready     - / -  2    0    2   0   9216  none    4 a
5         Emj----oe--fMB---x- ready     - / -  0    0    0   0   9216  none
6         Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
7         Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
8         Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
9         Emj----oe--fMB---x- ready     - / -  0    0    0   0   9216  none
10        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
11        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
12        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
13        Emj----oe--fMB---x- ready     - / -  0    0    0   0   9216  none
14        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
15        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
16        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
17        Emj----oe--fMB---x- ready     - / -  0    0    0   0   9216  none
18        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
19        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
20        Emj----oe--fMB---x- NotPresent- / -  0    0    0   0   9216  none
21        Emj----oe--fMB---x- ready     - / -  0    0    0   0   9216  none
================================================================================
> indicates Port Display Name truncated past 8 characters
Flags : a - Load Sharing Algorithm address-based, D - Port Disabled,
        e - Extreme Discovery Protocol Enabled, E - Port Enabled,
        g - Egress TOS Enabled, i - Isolation, j - Jumbo Frame Enabled,
        l - Load Sharing Enabled, m - MACLearning Enabled,
        n - Ingress TOS Enabled, o - Dot1p Replacement Enabled,
        P - Software redundant port(Primary),
        R - Software redundant port(Redundant),
        q - Background QOS Monitoring Enabled,
        s - diffserv Replacement Enabled,
        v - Vman Enabled, f - Unicast Flooding Enabled,
        M - Multicast Flooding Enabled, B - Broadcast Flooding Enabled
        L - Extreme Link Status Monitoring Enabled
        O - Ethernet OAM Enabled
        w - MACLearning Disabled with Forwarding
        b - Rx and Tx Flow Control Enabled, x - Rx Flow Control Enabled
        p - Priority Flow Control Enabled
```

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```
* X770_ToR_1.8 # show ports configuration  no-refresh
Port Configuration
Port      Virtual    Port  Link  Auto   Speed      Duplex   Flow  Load   Media
          router     State State Neg  Cfg Actual Cfg Actual Cntrl Master Pri Red
================================================================================
ESXi      VR-Default  E      R   OFF 10000       FULL                  1  Q+CR4F3m
HyperV    VR-Default  E      R   OFF 10000       FULL                  2  Q+CR4F3m
Linux     VR-Default  E      R   OFF 10000       FULL                  3  Q+CR4F3m
Ixia      VR-Default  E      R   OFF 10000       FULL                  4  Q+CR4F3m
5         VR-Default  E      R   OFF 40000       FULL                     NONE
6         VR-Default  E     NP   OFF 10000       FULL                     NONE
7         VR-Default  E     NP   OFF 10000       FULL                     NONE
8         VR-Default  E     NP   OFF 10000       FULL                     NONE
9         VR-Default  E      R   OFF 40000       FULL                     NONE
10        VR-Default  E     NP   OFF 10000       FULL                     NONE
11        VR-Default  E     NP   OFF 10000       FULL                     NONE
12        VR-Default  E     NP   OFF 10000       FULL                     NONE
13        VR-Default  E      R   OFF 40000       FULL                     NONE
14        VR-Default  E     NP   OFF 10000       FULL                     NONE
15        VR-Default  E     NP   OFF 10000       FULL                     NONE
16        VR-Default  E     NP   OFF 10000       FULL                     NONE
17        VR-Default  E      R   OFF 40000       FULL                     NONE
18        VR-Default  E     NP   OFF 10000       FULL                     NONE
19        VR-Default  E     NP   OFF 10000       FULL                     NONE
20        VR-Default  E     NP   OFF 10000       FULL                     NONE
================================================================================
> indicates Port Display Name truncated past 8 characters
Link State: A-Active, R-Ready, NP-Port Not Present, L-Loopback
Port State: D-Disabled,E-Enabled, Media: %-Licensed, !-Unsupported, $-Restricted
Media Red: * - use "show port info detail" for redundant media type
Flow Cntrl: Shows link partner's abilities. NONE if Auto Neg is OFF
* X770_ToR_1.8 #
```

```
X770_ToR_1.6 # show ports statistics
^[Port Statistics                                    Mon Sep 15 09:49:01 2014
Port      Link     Tx Pkt       Tx Byte       Rx Pkt       Rx Byte Rx Pkt Rx Pkt
          State    Count        Count         Count        Count    Bcast  Mcast
================================================================================
ESXi      R            0            0             0            0        0        0
HyperV    R            0            0             0            0        0        0
Linux     R            0            0             0            0        0        0
Ixia      R          109        14594             0            0        0        0
5         R            0            0             0            0        0        0
6         NP           0            0             0            0        0        0
7         NP           0            0             0            0        0        0
8         NP           0            0             0            0        0        0
9         R            0            0             0            0        0        0
10        NP           0            0             0            0        0        0
11        NP           0            0             0            0        0        0
12        NP           0            0             0            0        0        0
13        R            0            0             0            0        0        0
14        NP           0            0             0            0        0        0
15        NP           0            0             0            0        0        0
16        NP           0            0             0            0        0        0
================================================================================
          > indicates Port Display Name truncated past 8 characters
          Link State: A-Active, R-Ready, NP-Port Not Present L-Loopback
          0->Clear Counters  U->page up  D->page down ESC->exit
```

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```
X770_ToR_1.7 # show ports sharing
Load Sharing Monitor
Config    Current    Agg       Ld Share    Ld Share  Agg   Link    Link Up
Master    Master     Control   Algorithm   Group     Mbr   State   Transitions
================================================================================
     1               LACP      L2          1         -     R       0
     2               LACP      L2          2         -     R       0
     3               LACP      L2          3         -     R       0
     4               LACP      L2          4         -     R       2
    41     41        LACP      L3_L4       41        Y     A       2
                               L3_L4       42        Y     A       2
                               L3_L4       43        Y     A       3
                               L3_L4       44        Y     A       2
    49               LACP      L3_L4       49        -     A       4
                               L3_L4       53        -     A       4
                               L3_L4       57        -     A       4
                               L3_L4       61        -     A       4
================================================================================
Link State: A-Active, D-Disabled, R-Ready, NP-Port not present, L-Loopback
Load Sharing Algorithm: (L2) Layer 2 address based, (L3) Layer 3 address based
                        (L3_L4) Layer 3 address and Layer 4 port based
                        (custom) User-selected address-based configuration
Custom Algorithm Configuration: ipv4 L3-and-L4, xor
Number of load sharing trunks: 6
```

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VLANs and VRs

As mentioned before, by default, all ports are enabled and in the “Default” VLAN. To add ports to other user-defined VLANs, these ports must be first removed from the default VLAN. To do this, use the commands:

```
configure vlan default delete ports all
```

Tagging and untagging VLANs on ports is one way the switch handles and directs traffic on multiple subnets. The best way to remember whether the port needs to be tagged or untagged is what the port’s purpose will be. Generally speaking, an untagged port is plugged into an end-user device, such as a PC or a printer. A tagged port is a trunk port that is used to transport multiple VLANs over a common single Ethernet link. Tagged ports are uplink/downlink ports. Each port can have one VLAN untagged and multiple VLANs tagged.

The following are examples. If a port is added to a VLAN without specifying “tagged” or “untagged” keyword, it defaults to add as untagged.

```
create vlan Red
configure Red ipaddress 10.1.10.1/24
configure Red tag 10
configure Red add ports 1-12 untagged
configure Red add ports 1 tag

create vlan Blue
configure Blue ipaddress 10.1.20.1/24
configure Blue tag 20
configure Blue add ports 1:1-1:12, 5:1 tagged
```

Notice the difference in the port numbering scheme, which is because ExtremeXOS runs on both standalone and modular switches. On a standalone switch, such as a Summit family switch, the port number is simply noted by the physical port number (e.g., port 1, as seen above). On a modular switch and SummitStack, the port number is a combination of the slot number and the port number (e.g., port 1:1, as seen above).

VLANs are in the context of Virtual Routers (VRs), and by default they are in the VR-Default VR. If you want to use different VRs for more strict logical separation, you need to delete the ports from the default and added to the user-defined VR.

For example, to move port 34 from VR-Default to VR-New and add it to a new VLAN in that VR:

```
configure vr VR-Default delete ports 34
create vr VR-New
configure vr VR-New add ports 34
create vlan Blue vr VR-New
configure vlan “Blue” add ports 34
```

To view configured VLANs and VRs through CLI, use the commands

```
show vlan
show vr
```

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```
* X770_ToR_1.4 # show vlan
-------------------------------------------------------------------------------------------------
Name            VID  Protocol Addr       Flags                        Proto  Ports  Virtual
                                                                             Active router
                                                                             /Total
-------------------------------------------------------------------------------------------------
blue            1000 ------------------------------------------------- ANY    2 /6   VR-Default
Default         1    ------------------------------------------------- ANY    0 /0   VR-Default
holding         4093 ------------------------------------------------- ANY    0 /0   VR-Default
ISC             10   192.168.1.1    /30  ------I---------------------- ANY    1 /1   VR-Default
iSCSI_1         11   ------------------------------------------------- ANY    0 /0   VR-Default
iSCSI_2         12   ------------------------------------------------- ANY    0 /0   VR-Default
Mgmt            4095 10.65.1.100    /24  ----------------------------- ANY    1 /1   VR-Mgmt
red             1001 ------------------------------------------------- ANY    2 /6   VR-Default
-------------------------------------------------------------------------------------------------
Flags : (B) BFD Enabled, (c) 802.1ad customer VLAN, (C) EAPS Control VLAN,
        (d) Dynamically created VLAN, (D) VLAN Admin Disabled,
        (e) CES Configured, (E) ESRP Enabled, (f) IP Forwarding Enabled,
        (F) Learning Disabled, (h) TRILL Enabled, (i) ISIS Enabled,
        (I) Inter-Switch Connection VLAN for MLAG, (k) PTP Configured,
        (l) MPLS Enabled, (L) Loopback Enabled, (m) IPmc Forwarding Enabled,
        (M) Translation Member VLAN or Subscriber VLAN, (n) IP Multinetting Enabled,
        (N) Network Login VLAN, (o) OSPF Enabled, (O) Flooding Disabled,
        (p) PIM Enabled, (P) EAPS protected VLAN, (r) RIP Enabled,
        (R) Sub-VLAN IP Range Configured, (s) Sub-VLAN, (S) Super-VLAN,
        (t) Translation VLAN or Network VLAN, (T) Member of STP Domain,
        (v) VRRP Enabled, (V) VPLS Enabled, (W) VPWS Enabled, (Z) OpenFlow Enabled

Total number of VLAN(s) : 8

* X770_ToR_1.10 # show vr
Virtual                                  Number of    Number of    Flags
Router                                   VLANs        Ports
-------------------------------------------------------------------------------
VR-Control                                        0            0    --------S46
VR-Default                                        7          104    boprimORS46
VR-Mgmt                                           1            0    --------S46
-------------------------------------------------------------------------------
Flags : Virtual Router Type
          (S) System, (U) User, (F) Non-VPN VRF, (N) VPN VRF
        : Virtual Router Admin State
          (-) Disabled (4) IPv4 Enabled, (6) IPv6 Enabled
        : Routing protocols configured on the virtual router
          (b) BGP, (i) ISIS, (m) MPLS, (o) OSPF, (p) PIM, (r) RIP,
          (O) OSPFv3, (R) RIPng
System Totals           :
Total VRs               :     3    Max VRs               :  1026
Total User VRs          :     0    Max User VRs          :    63
Total Non-VPN VRFs      :     0    Max VRFs              :   960
Total VPN VRFs          :     0
Total System VRs        :     3
Total Router Interfaces :     2
Total Protocols         :     8    Max Protocols         :    64
Total IPv4 VLANs        :     2    Total IPv6 VLANs      :     0
Active IPv4 VLANs       :     2    Active IPv6 VLANs     :     0
Inactive IPv4 VLANs     :     0    Inactive IPv6 VLANs   :     0
Max Shared GWs (Cur)    :     4    Max Shared GWs (Cfg)  :     4
```

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Basic Layer 2

The command **show fdb** will show the MAC addresses and associated VLANs that the switch has learned.

```
X770_ToR_1.8 # show fdb
Mac                     Vlan       Age  Flags         Port / Virtual Port List
------------------------------------------------------------------------------
00:00:5e:00:01:01       blue(1000) 0034 d m        S   41
00:00:5e:00:01:02        red(1001) 0034 d m        S   41
00:04:96:52:bc:a6       blue(1000) 0011 d m        S   41
00:04:96:6d:79:8a       blue(1000) 0141 d m        S   41
00:04:96:6d:79:8a        red(1001) 0065 d m        S   41
00:04:96:7d:d5:8c       blue(1000) 0153 d m        S   41
00:04:96:7d:d5:8c        red(1001) 0103 d m        S   41
00:04:96:8f:cd:5b        ISC(0010) 0000 s m        S   41

Flags : d - Dynamic, s - Static, p - Permanent, n - NetLogin, m - MAC, i - IP,
        x - IPX, l - lockdown MAC, L - lockdown-timeout MAC, M- Mirror, B - Egress Blackhole,
        b - Ingress Blackhole, v - MAC-Based VLAN, P - Private VLAN, T - VLAN translation,
        D - drop packet, h - Hardware Aging, o - IEEE 802.1ah Backbone MAC,
        S - Software Controlled Deletion, r - MSRP,
        R - TRILL Rbridge, Z - OpenFlow

Total: 8 Static: 1  Perm: 0  Dyn: 7  Dropped: 0  Locked: 0  Locked with Timeout: 0
FDB Aging time: 300
```

Protocols

Consider whether the network will use STP, MLAG, SPB, TRILL, EAPS, etc. Below is a simple STP example:

```
create stpd DATA_stp
configure DATA_stp mode dot1w
configure DATA_stp tag 10
configure DATA_stp add vlan_red ports 49-50 emistp
enable DATA_stp rapid-root-railover
```

For other Layer 2 protocols, refer to the *ExtremeXOS User Guide*.

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Layer 2 Loop Protection

Basic Layer 2 loop protection is essential to protect the network against looping packets and broadcast storms. Consider whether the network will use STP, MLAG, SPB, TRILL, EAPS, etc. As a starting point consider STP Edge Safeguard and BPDU restrict which prevents accidental or deliberate misconfigurations that cause loops, by having edge ports enter the blocking state upon receiving a BPDU.

The following is an example configuration:

```
configure stpd DATA_stp ports edge-safeguard enable 9 recovery-timeout 400
configure stpd DATA_stp ports bpdu-restrict enable 9 recovery-timeout 400
```

Also consider Extreme Loop Recovery Protocol (ELRP) to detect loops. ELRP can block certain ports to prevent loop or logging a message to system log.

For example, ELRP can be configured on vlan “blue” excluding uplink port 20:

```
enable elrp-client
configure elrp-client periodic blue ports all interval 5 log disable-port permanent
configure elrp-client disable-ports exclude 20
```

Basic Layer 3

VLANs can be enabled for IP forwarding and ports can be added to VLANs to be part of that network. The steps required are:

1. Create the VLAN (by default the VLAN is added to VR “VR-Default”).
2. Define the tag associated with that VLAN.
3. Add ports to the VLAN as tagged or untagged.
4. Configure the IP address for that VLAN.
5. Enable IP forwarding for that VLAN.

The following is an example of the above steps:

```
create vlan blue
configure vlan blue tag 100
configure vlan blue add ports 3 tagged
configure vlan blue add ports 4 untagged
configure vlan blue ipaddress 192.168.1.2/24
enable ipforwarding blue
```

You can view VLAN IP addresses with the command **show vlan**, and view other IP information on the switch with the following commands:

```
show ipconfig
show ipstats
show iproute
show iparp
```

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```
X770_ToR_1.9 # show ipconfig
       Use Redirects : Disabled
       IpOption LSRR : Enabled
       IpOption SSRR : Enabled
         IpOption RR : Enabled
         IpOption TS : Enabled
         IpOption RA : Enabled
       Route Sharing : Disabled
  Originated Packets : Don't require ipforwarding
  IP Fwding into LSP : Disabled
 Max Shared Gateways : Current: 4  Configured: 4
  Route Sharing Hash : CRC Lower

      IRDP:
         Advertisement Address: 255.255.255.255      Maximum Interval: 600
         Minimum Interval: 450     Lifetime: 1800  Preference: 0

Interface    IP Address          Flags                    nSIA
ISC          192.168.1.1     /30 EU----MPuRX---------     0

Flags: (A) Address Mask Reply Enabled (B) BOOTP Enabled
       (b) Broadcast Forwarding Enabled
       (D) Duplicate address detected on VLAN, (E) Interface Enabled
       (f) Forwarding Enabled (g) Ignore IP Broadcast Enabled
       (h) Directed Broadcast Forwarding by Hardware Enabled
       (I) IRDP Advertisement Enabled, (M) Send Parameter Problem Enabled
       (m) Multicast forwarding Enabled, (n) Multinetted VLAN
       (nSIA ) Number of Secondary IP Addresses
       (P) Send Port Unreachables Enabled, (R) Send Redirects Enabled
       (r) Unicast Reverse Path Enabled on at least one port of the VLAN
       (t) Tentative address, (T) Time Stamp Reply Enabled
       (u) Send Unreachables Enabled, (U) Interface Up
       (v) VRRP Enabled, (X) Send Time Exceeded Enabled
```

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```
X770_ToR_1.10 # show ipstats
IP Global Statistics
InReceives =    1074595 InUnicast  =     973338 InBcast    =          0
                        InMcast    =     101257
InHdrErr   =          0 Bad vers   =          0 Bad chksum =          0
                        Short pkt  =          0 Short hdr  =          0
                        Bad hdrlen =          0 Bad length =          0
InDelivers =    1009643 InDiscards =          0 Bad Proto  =          0
OutRequest =     989730 OutDiscard =          0 OutNoRoute =          5
Forwards   =          0 ForwardOK  =          0 Fwd Err    =          0
NoFwding   =          0 Redirects  =          0 No route   =          0
Bad TTL    =          0 Bad MC TTL =          0
Bad IPdest =          0 Blackhole  =          0 Output err =          0
MartianSrc =          0
FragCreate =          0 FragOKs    =          0 FragFails  =          0

Global ICMP Statistics
OutResp    =          3 OutError   =          0 InBadcode  =          0
InTooshort =          0 Bad chksum =          0 In Badlen  =          0
echo reply                      In =          0        Out =          3
destination unreachable         In =         83        Out =          0
 - protocol unreachable         In =          0        Out =          0
redirect                        In =          0        Out =          0
echo                            In =          3        Out =          0
router advertisement            In =          0        Out =          0
time exceeded                   In =          0        Out =          0

Global IGMP Statistics
Out Query  =       6774 Out Report =          0 Out Leave  =          0
In Query   =      13506 In Report  =         29 In Leave   =          0
In Error   =          0

Router Interface ISC
     inet 192.168.1.1 netmask 255.255.255.252 broadcast 192.168.1.3
     Stats:  IN         OUT
              0     1009614 packets
              0      989691 octets
              0           0 Mcast pkts
              0           0 Bcast pkts
              0    60578822 errors
              0    59646564 discards
              0             unknown protos
```

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```
X770_ToR_1.11 # show iproute
Ori  Destination        Gateway         Mtr  Flags         VLAN       Duration
#d   192.168.1.0/30     192.168.1.1     1    U------um--f- ISC        9d:18h:59m:55s

Origin(Ori): (b) BlackHole, (be) EBGP, (bg) BGP, (bi) IBGP, (bo) BOOTP,
       (ct) CBT, (d) Direct, (df) DownIF, (dv) DVMRP, (e1) ISISL1Ext,
       (e2) ISISL2Ext, (h) Hardcoded, (i) ICMP, (i1) ISISL1 (i2) ISISL2,
       (is) ISIS, (mb) MBGP, (mbe) MBGPExt, (mbi) MBGPInter, (mp) MPLS Lsp,
       (mo) MOSPF (o) OSPF, (o1) OSPFExt1, (o2) OSPFExt2,
       (oa) OSPFIntra, (oe) OSPFAsExt, (or) OSPFInter, (pd) PIM-DM, (ps) PIM-SM,
       (r) RIP, (ra) RtAdvrt, (s) Static, (sv) SLB_VIP, (un) UnKnown,
       (*) Preferred unicast route (@) Preferred multicast route,
       (#) Preferred unicast and multicast route.

Flags: (b) BFD protection requested, (B) BlackHole, (c) Compressed, (D) Dynamic,
       (f) Provided to FIB, (G) Gateway, (H) Host Route, (l) Calculated LDP LSP,
       (L) Matching LDP LSP, (m) Multicast, (p) BFD protection active, (P) LPM-routing,
       (R) Modified, (s) Static LSP, (S) Static, (t) Calculated RSVP-TE LSP,
       (T) Matching RSVP-TE LSP, (u) Unicast, (U) Up, (3) L3VPN Route.

MPLS Label: (S) Bottom of Label Stack
Mask distribution:
     1 routes at length 30

Route Origin distribution:
     1 routes from Direct

Total number of routes = 1
Total number of compressed routes = 0
```

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Basic Administration

This section is only starting point and represents a tiny subset of the functionality and options within EXOS. Please refer to ExtremeXOS documentation on the Extreme documentation page for full descriptions.

SNMP

First, configure SNMP identification information. The following is an example:

```
configure snmp sysName "x770_ToR_1"
configure snmp sysLocation "DC Raleigh"
configure snmp sysContact "Jane Maxwell"
```

Configure the SNMP community strings and ensure they are consistent with the SNMP settings configured in Extreme NetSight to enable the Extreme switches to authenticate properly. The following is a sample SNMPv2 configuration:

```
config snmp delete community all
config snmp add community readwrite RW
config snmp add community readonly RO
config snmp add trapreceiver 192.168.1.1 community RW from 192.168.61.2 vr VR-Mgmt
```

The following is a sample SNMPv3 configuration:

```
configure snmpv3 add user snmpuser authentication md5 snmpauthcred privacy snmpprivcred
configure snmpv3 add group admin user snmpuser sec-model usm
```

To view SNMP settings, use the command:

```
show switch
show management
show snmpv3 community
```

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```
X770_ToR_1.13 # show management
CLI idle timeout                  : Enabled (20 minutes)
CLI max number of login attempts : 3
CLI max number of sessions        : 8
CLI paging                        : Enabled (this session only)
CLI space-completion              : Disabled (this session only)
CLI configuration logging         : Disabled
CLI scripting                     : Disabled (this session only)
CLI scripting error mode          : Ignore-Error (this session only)
CLI persistent mode               : Persistent (this session only)
CLI prompting                     : Enabled (this session only)
Telnet access                     : Enabled (tcp port 23 vr all)
                                  : Access Profile : not set
SSH Access                        : ssh module not loaded.
Web access                        : Enabled (tcp port 80)
                                  : Access Profile : not set
Total Read Only Communities       : 1
Total Read Write Communities      : 2
RMON                              : Disabled
SNMP access                       : Enabled
                                  : Access Profile : not set
SNMP Compatibility Options        :
    GETBULK Reply Too Big Action : Too Big Error
    IP Fragmentation              : Disallow
SNMP Traps                        : Enabled
SNMP v1/v2c TrapReceivers         : None

SNMP stats:     InPkts 5817    OutPkts   5817    Errors 12      AuthErrors 12
                Gets   5148    GetNexts  611     Sets   0       Drops      0
SNMP traps:     Sent   0       AuthTraps Enabled
SNMP inform:    Sent   0       Retries   0       Failed 0
```

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```
X770_ToR_1.14 # show snmpv3 community

Community Index   : SAILAB
Community Name    : SAILAB
Security Name     : v1v2c_rw
Context EngineID  : 80:00:07:7c:03:00:04:96:97:e1:35
Context Name      :
Transport Tag     :
Storage Type      : NonVolatile
Row Status        : Active

Community Index   : private
Community Name    : private
Security Name     : v1v2c_rw
Context EngineID  : 80:00:07:7c:03:00:04:96:97:e1:35
Context Name      :
Transport Tag     :
Storage Type      : NonVolatile
Row Status        : Active

Community Index   : public
Community Name    : public
Security Name     : v1v2c_ro
Context EngineID  : 80:00:07:7c:03:00:04:96:97:e1:35
Context Name      :
Transport Tag     :
Storage Type      : NonVolatile
Row Status        : Active

Total num. of entries in snmpCommunityTable : 3
```

DNS

The following is an example that shows configuration of one or more Domain Name System (DNS) servers and domain-suffixes:

```
configure dns-client add name-server 10.1.1.1 vr VR-Mgmt
configure dns-client add name-server 10.2.2.2 vr VR-Mgmt
configure dns-client add name-server 10.3.3.3 vr VR-Mgmt
configure dns-client add domain-suffix yourcompany.com
enable dns-client
```

SNTP

The following examples shows configuration of a Simple Network Time Protocol (SNTP) server for the switch to obtain time information:

```
configure sntp-client primary 10.1.7.32 vr VR-Mgmt
enable sntp-client
```

To verify SNTP configuration, use the command **show sntp-client**:

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```
X770_ToR_1.15 # show sntp-client
SNTP client is enabled
SNTP time is valid
Primary server:10.6.24.32  VR-Mgmt
Secondary server:timehost-0.extremenetworks.com  VR-Mgmt
Broadcasts: VR-Mgmt
Query interval:64
Last valid SNTP update: From server:10.6.24.32, on Mon Sep 15 09:50:05 2014

SNTPC Statistics:
 Packets transmitted:
  to primary server:            13241
  to secondary server:          1
 Packets received with valid time:
  from Primary server:          13212
  from Secondary server:        0
  from Broadcast server:        0
 Packets received without valid time:
  from Primary server:          0
  from Secondary server:        0
  from Broadcast server:        0
 Replies not received to requests:
  from Primary server:          29
  from Secondary server:        1
```

Logging

Local

The following example configures logging to the local memory buffer and maintains a running real-time display of log messages on the console display:

configure log target memory-buffer number-of-messages 5000
enable log target console

To view contents of the log buffer, use the command **show log**.

```
X770_ToR_1.16 # show log
09/15/2014 09:47:54.46 <Info:AAA.authPass> Login passed for user admin through telnet (10.6.82.177)
09/12/2014 16:39:26.86 <Warn:NetTools.SNTP.TxReqToSrvrFail> Failed to send SNTP request to server tim
09/12/2014 16:32:14.87 <Warn:NetTools.SNTP.TxReqToSrvrFail> Previous message repeated 27 additional t
09/12/2014 12:57:27.92 <Info:AAA.logout> User admin logout from telnet (10.6.82.209)
09/12/2014 12:55:17.56 <Info:AAA.authPass> Login passed for user admin through telnet (10.6.82.209)
09/12/2014 10:31:03.61 <Info:AAA.logout> User admin logout from telnet (10.6.82.209)
09/12/2014 10:27:01.83 <Info:AAA.authPass> Login passed for user admin through telnet (10.6.82.209)
09/12/2014 10:21:14.09 <Info:AAA.logout> User admin logout from telnet (10.6.82.209)
09/12/2014 09:58:31.13 <Info:AAA.authPass> Login passed for user admin through telnet (10.6.82.209)
09/11/2014 17:29:38.67 <Info:AAA.logout> User admin logout from telnet (10.6.82.209)
09/11/2014 17:21:23.69 <Info:AAA.authPass> Login passed for user admin through telnet (10.6.82.209)
09/11/2014 17:21:21.84 <Warn:AAA.authFail> Login failed for user admin through telnet (10.6.82.209)
09/11/2014 13:54:12.82 <Info:AAA.logout> User admin logout from telnet (10.6.82.209)
```

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To count the number of occurrences of events in the log, use the additional options shown below:

```
X770_ToR_1.17 # show log counters all occurred
Component   SubComponent Condition              Severity      Occurred I Ntfd
----------- ------------ ---------------------- ------------ -------- - ----
AAA                      authFail               Warning             2 Y    2
AAA                      authPass               Info               43 Y   43
AAA                      localAuthen            Debug-Summary      45 N    0
AAA                      logout                 Info               42 Y   42
AAA                      reqFromPeer            Debug-Summary      45 N    0
AAA                      sessions               Debug-Summary      44 N    0
AAA                      Trace                  Debug-Summary    1593 N    0
AAA                      usingLocal             Debug-Summary      45 N    0
AAA         RADIUS       RadiusAccEnable        Info                4 N    0
AAA         RADIUS       RadiusDisable          Info               26 N    0
AAA         RADIUS       RadiusEnable           Info                4 N    0
AAA         RADIUS       serverFailInit         Warning             4 Y    4
AAA         RADIUS       Trace                  Debug-Summary       4 N    0
ACL                      DebugSummary           Debug-Summary       5 N    0
ACL                      RecvRspns              Debug-Verbose       4 N    0
ACL         Policy       bind                   Notice              2 Y    2
ACL         Policy       unBind                 Notice              3 Y    3
BFD                      DebugVerbose           Debug-Verbose      31 N    0
BFD                      InitDone               Info                1 N    0
BFD                      InitSrvrDone           Info                2 N    0
BFD                      RecvSrvrMsg            Debug-Verbose       4 N    0
```

Remote

The following example enables remote logging to a syslog server and specifies the facility (local0…local7) to group syslog data:

configure syslog add 10.65.0.69:514 vr VR-Mgmt local0
enable log target syslog 10.65.0.69:514 vr VR-Mgmt local0

After configuration, verify that the switch can ping the syslog server. Unless otherwise specified, ping presumes VR-Default, so the ping command will need to specify VR-Mgmt:

```
X770_ToR_1.19 # ping vr "VR-Mgmt" 10.65.0.1
Ping(ICMP) 10.65.0.1: 4 packets, 8 data bytes, interval 1 second(s).
16 bytes from 10.65.0.1: icmp_seq=0 ttl=64 time=11 ms
16 bytes from 10.65.0.1: icmp_seq=1 ttl=64 time=2.745 ms
16 bytes from 10.65.0.1: icmp_seq=2 ttl=64 time=2.569 ms
16 bytes from 10.65.0.1: icmp_seq=3 ttl=64 time=2.490 ms

--- 10.65.0.1 ping statistics ---
4 packets transmitted, 4 packets received, 0% loss
round-trip min/avg/max = 2/4/11 ms
```

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Access Authentication and Authorization

The following example configures RADIUS or TACACS+ to point to the AAA server, which could be NAC provided by Extreme Networks (NAC IP in this example is 10.1.10.254).

```
config radius mgmt primary server 10.1.10.254 1812 client-ip 10.1.10.1 vr vr-default
config radius mgmt primary shared-secret extreme
enable radius
```

CLI Scripting

To streamline deployment and administration of the network, you can leverage ExtremeXOS automated switch management capabilities. The CLI-based scripting, with TCL and python support, allows you to significantly automate switch management through support of variables and functions that you customize for handling special events.

ExtremeXOS has a flexible framework that ties into the Event Management System (EMS) for selected trigger events to activate dynamic profiles, such as when a user or device connects to a switch port. These profiles contain script commands and cause dynamic changes to the switch configuration. They can also be used for general manageability of the network or to enforce policies.

The following sample script sorts the FDB table in descending order:

```
set var CLI.OUT " "
show fdb
set var x1 $TCL(split ${CLI.OUT} "\n")
set var x2 $TCL(lsort -decreasing $x1)
set var output $TCL(join $x2 "\n")
show var output
```

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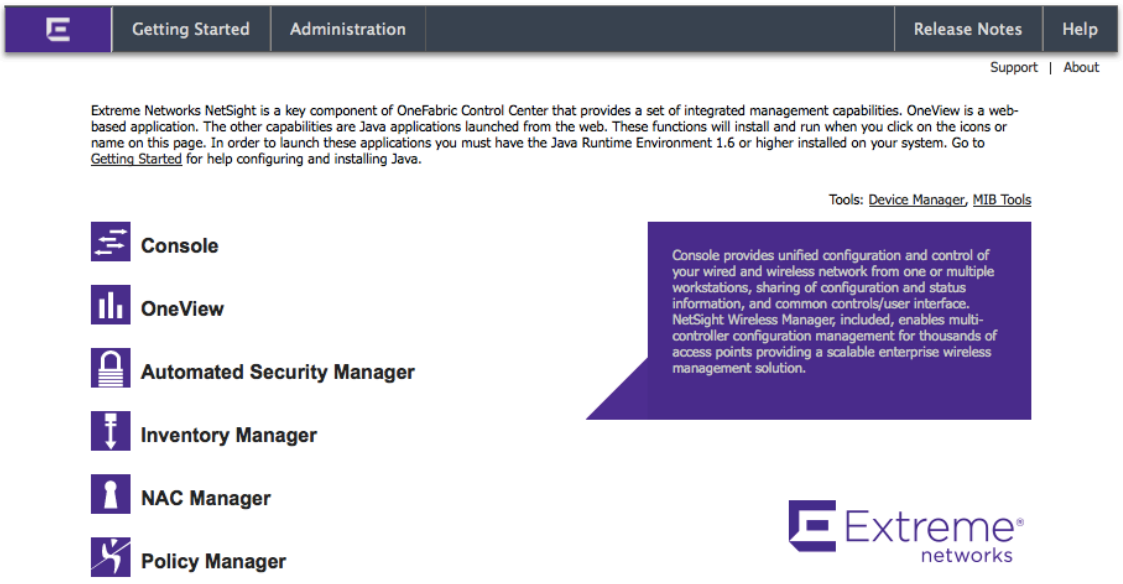
Integrated NMS and NAC

This section is only starting point and represents a tiny subset of the functionality and options within EXOS. Please refer to ExtremeXOS documentation on the Extreme documentation page for full descriptions.

Single Pane of Glass Management

Extreme's "single pane of glass" management system provides wired/wireless visibility and control from the data center to the mobile edge. The intelligence, automation, and integration of management software enable the IT organization to optimize the efficiency of network operations and reduce total cost of ownership.

Managing complex network infrastructures involves monitoring hundreds or thousands of business-critical devices, and these tools are essential for management. NetSight presents everything in a consolidated place.


Getting Started
Administration
Release Notes
Help
Support | About
Extreme Networks NetSight is a key component of OneFabric Control Center that provides a set of integrated management capabilities. OneView is a web-based application. The other capabilities are Java applications launched from the web. These functions will install and run when you click on the icons or name on this page. In order to launch these applications you must have the Java Runtime Environment 1.6 or higher installed on your system. Go to Getting Started for help configuring and installing Java.
Tools: Device Manager, MIB Tools
Console
OneView
Automated Security Manager
Inventory Manager
NAC Manager
Policy Manager
Console provides unified configuration and control of your wired and wireless network from one or multiple workstations, sharing of configuration and status information, and common controls/user interface. NetSight Wireless Manager, included, enables multi-controller configuration management for thousands of access points providing a scalable enterprise wireless management solution.
Extreme networks

Device Discovery

Through NetSight Console, use the NetSight Discovery feature to automatically discover the new switches in the network by specifying the IP address range of the switches. The switch and NMS must have IP reachability.

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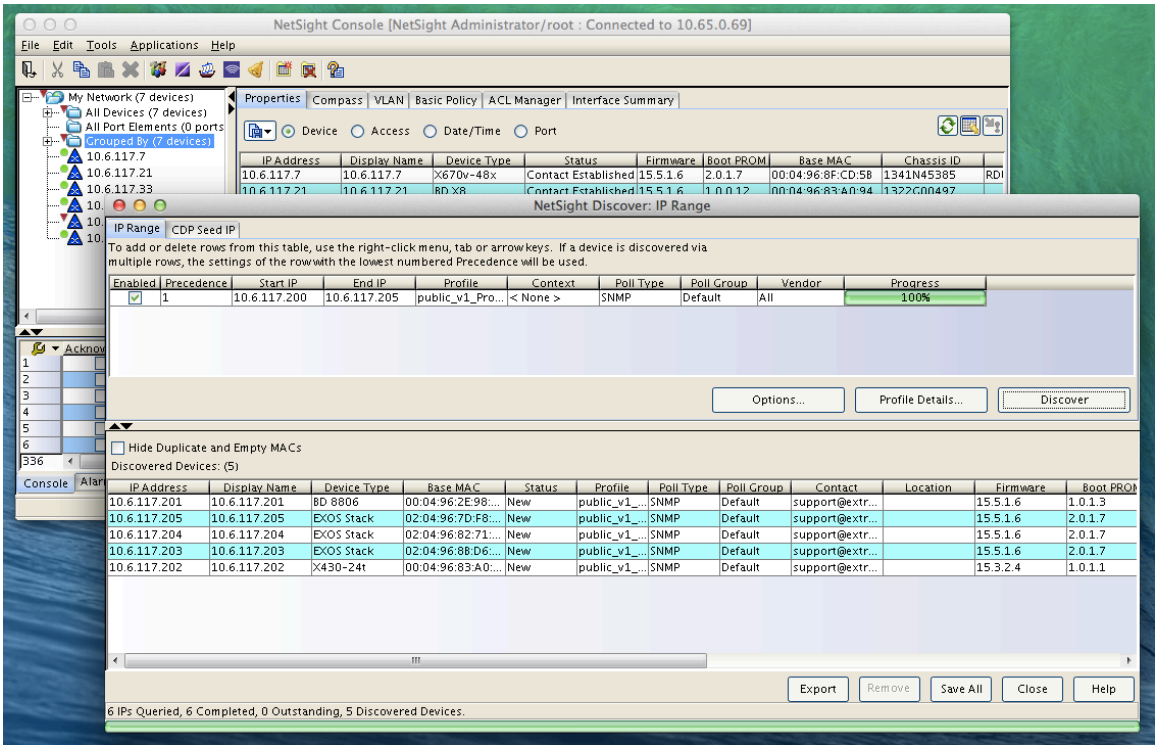
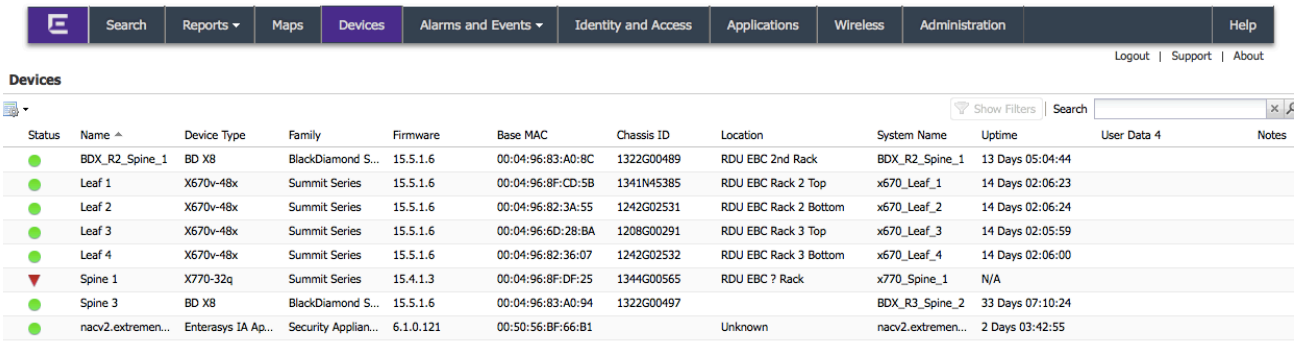

NetSight Console [NetSight Administrator/root : Connected to 10.65.0.69]
File Edit Tools Applications Help
My Network (7 devices)
All Devices (7 devices)
All Port Elements (0 ports)
Grouped By (7 devices)
10.6.117.7
10.6.117.21
10.6.117.33
Properties Compass VLAN Basic Policy ACL Manager Interface Summary
Device Access Date/Time Port
IP Address Display Name Device Type Status Firmware Boot PROM Base MAC Chassis ID
10.6.117.7 10.6.117.7 X670v-48x Contact Established 15.5.1.6 2.0.1.7 00:04:96:8F:CD:5B 1341N45385
NetSight Discover: IP Range
IP Range CDP Seed IP
To add or delete rows from this table, use the right-click menu, tab or arrow keys. If a device is discovered via multiple rows, the settings of the row with the lowest numbered Precedence will be used.
Enabled Precedence Start IP End IP Profile Context Poll Type Poll Group Vendor Progress
1 10.6.117.200 10.6.117.205 public_v1_Pro... < None > SNMP Default All 100%
Options... Profile Details... Discover
Hide Duplicate and Empty MACs
Discovered Devices: (5)
IP Address Display Name Device Type Base MAC Status Profile Poll Type Poll Group Contact Location Firmware Boot PROM
10.6.117.201 10.6.117.201 BD 8806 00:04:96:2E:98:... New public_v1_... SNMP Default support@extr... 15.5.1.6 1.0.1.3
10.6.117.205 10.6.117.205 EXOS Stack 02:04:96:7D:F8:... New public_v1_... SNMP Default support@extr... 15.5.1.6 2.0.1.7
10.6.117.204 10.6.117.204 EXOS Stack 02:04:96:82:71:... New public_v1_... SNMP Default support@extr... 15.5.1.6 2.0.1.7
10.6.117.203 10.6.117.203 EXOS Stack 02:04:96:8B:D6:... New public_v1_... SNMP Default support@extr... 15.5.1.6 2.0.1.7
10.6.117.202 10.6.117.202 X430-24t 00:04:96:83:A0:... New public_v1_... SNMP Default support@extr... 15.3.2.4 1.0.1.1
Export Remove Save All Close Help
6 IPs Queried, 6 Completed, 0 Outstanding, 5 Discovered Devices.

The NetSight Console should show messages including:

- “Discovery Complete”
- “Device Added”
- “Contact Established”

OneView Reporting

NetSight OneView Reporting is a unified interface for devices, alarms, running reports, collecting statistics.


Search Reports Maps Devices Alarms and Events Identity and Access Applications Wireless Administration Help
Logout | Support | About
Devices
Show Filters Search
Status Name Device Type Family Firmware Base MAC Chassis ID Location System Name Uptime User Data 4 Notes
BDX_R2_Spine_1 BD X8 BlackDiamond S... 15.5.1.6 00:04:96:83:A0:8C 1322G00489 RDU EBC 2nd Rack BDX_R2_Spine_1 13 Days 05:04:44
Leaf 1 X670v-48x Summit Series 15.5.1.6 00:04:96:8F:CD:5B 1341N45385 RDU EBC Rack 2 Top x670_Leaf_1 14 Days 02:06:23
Leaf 2 X670v-48x Summit Series 15.5.1.6 00:04:96:82:3A:55 1242G02531 RDU EBC Rack 2 Bottom x670_Leaf_2 14 Days 02:06:24
Leaf 3 X670v-48x Summit Series 15.5.1.6 00:04:96:6D:28:BA 1208G00291 RDU EBC Rack 3 Top x670_Leaf_3 14 Days 02:05:59
Leaf 4 X670v-48x Summit Series 15.5.1.6 00:04:96:82:36:07 1242G02532 RDU EBC Rack 3 Bottom x670_Leaf_4 14 Days 02:06:00
Spine 1 X770-32q Summit Series 15.4.1.3 00:04:96:8F:DF:25 1344G00565 RDU EBC ? Rack x770_Spine_1 N/A
Spine 3 BD X8 BlackDiamond S... 15.5.1.6 00:04:96:83:A0:94 1322G00497 BDX_R3_Spine_2 33 Days 07:10:24
nacv2.extremen... Enterasys IA Ap... Security Applian... 6.1.0.121 00:50:56:BF:66:B1 Unknown nacv2.extremen... 2 Days 03:42:55

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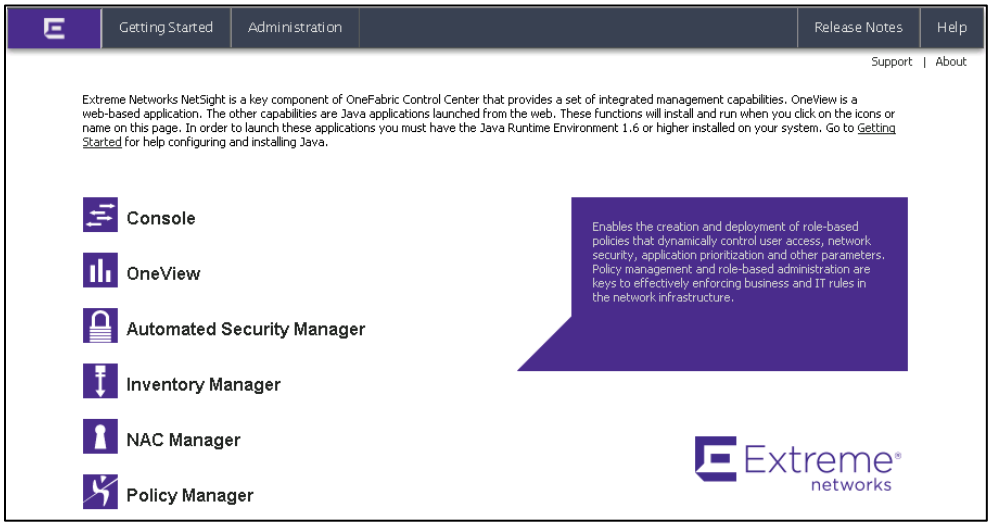
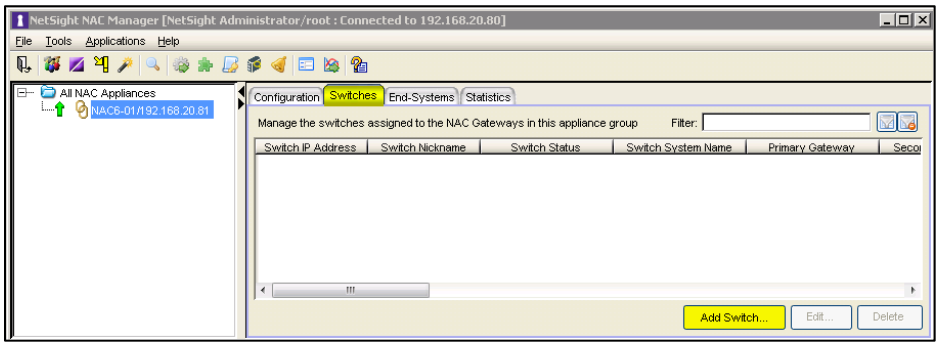
NAC Configuration

1. Using a web browser, access the NetSight launch page at the following URL: http://<NetSight Server IP>:8080
2. Click on “NAC Manager” to launch the NAC Manager application and log in using a NetSight administrator credentials.


Getting Started
Administration
Release Notes
Help
Support | About
Extreme Networks NetSight is a key component of OneFabric Control Center that provides a set of integrated management capabilities. OneView is a web-based application. The other capabilities are Java applications launched from the web. These functions will install and run when you click on the icons or name on this page. In order to launch these applications you must have the Java Runtime Environment 1.6 or higher installed on your system. Go to Getting Started for help configuring and installing Java.
Console
OneView
Automated Security Manager
Inventory Manager
NAC Manager
Policy Manager
Enables the creation and deployment of role-based policies that dynamically control user access, network security, application prioritization and other parameters. Policy management and role-based administration are keys to effectively enforcing business and IT rules in the network infrastructure.
Extreme networks

3. Select the Switches tab and then click Add Switch.



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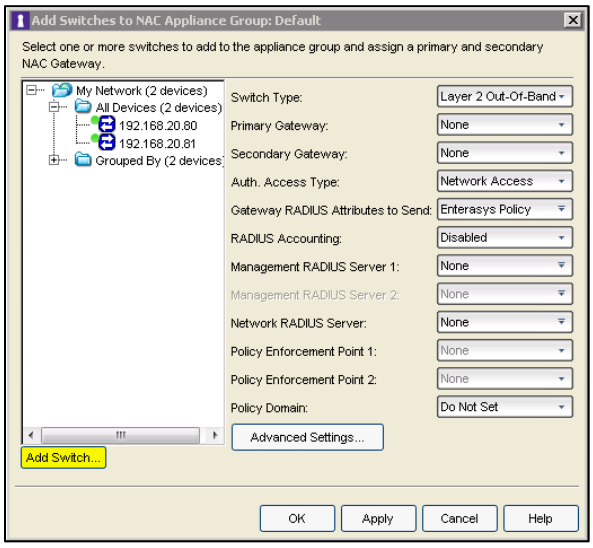
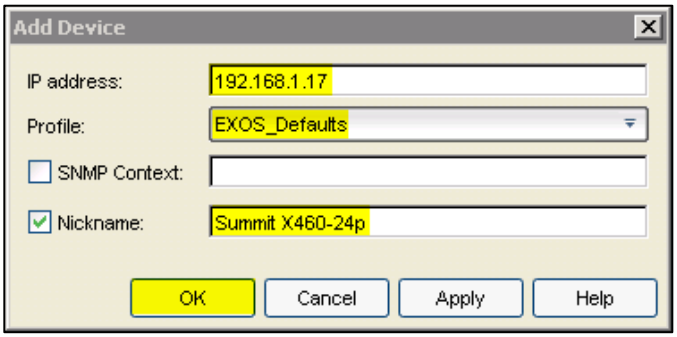
4. If the Extreme switch has not previously been added as a device in the NetSight console, click **Add Switch**. Otherwise, go to step 6.



5. In the **Add Device** window enter IP address of switch, and then select an SNMP profile from the drop-down list, or create a new profile by selecting **New**.
6. Enter a nickname for the device (optional) then click **OK**.



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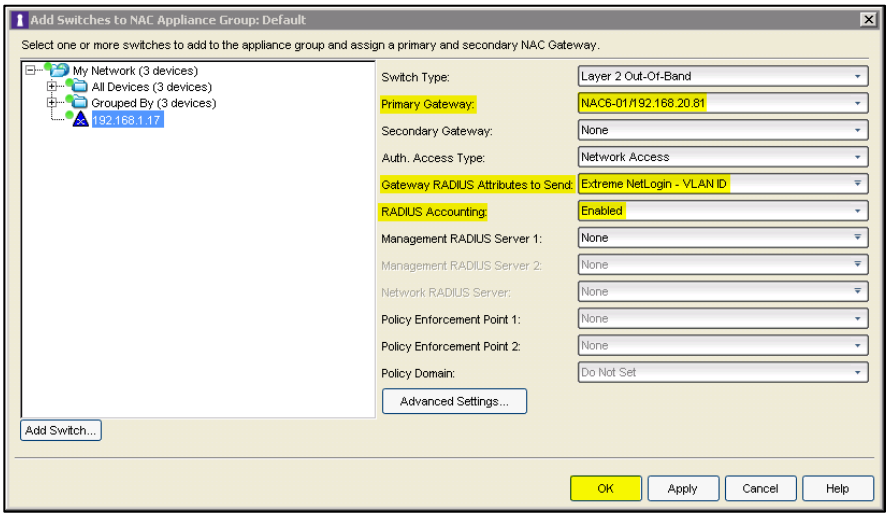
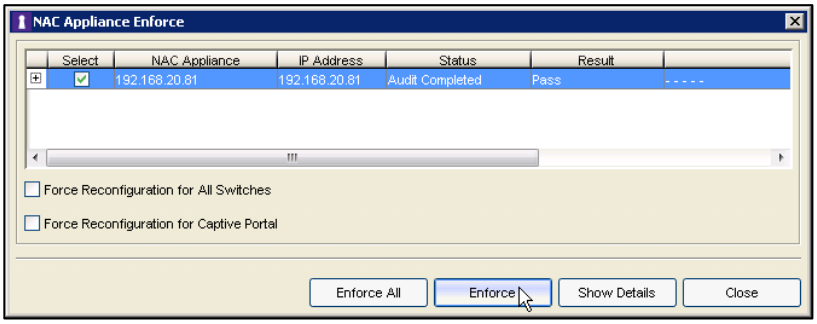
7. Next, select one or more switches to add to the appliance group:
   a. From the device list, select a switch.
   b. Using the drop-down menu, select a primary NAC gateway for the switch.
   c. Set “Gateway RADIUS Attributes to Send” to “Extreme NetLogin – VLAN ID”.
   d. Set “RADIUS Accounting” to “Enabled”.
   e. Leave remaining configurations set to their default setting.
   f. When finished, click **OK**.



8. Select the configured NAC Appliance from the list and click **Enforce**. When the enforce is finished, click **Close**.



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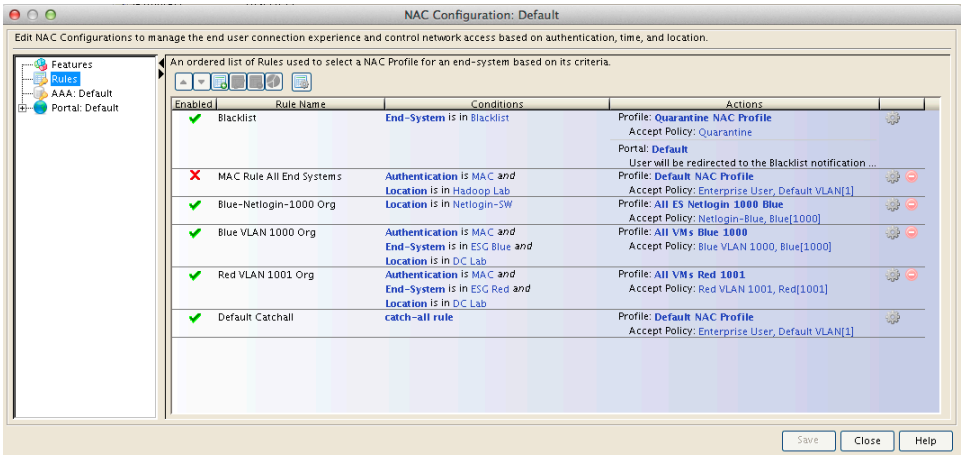
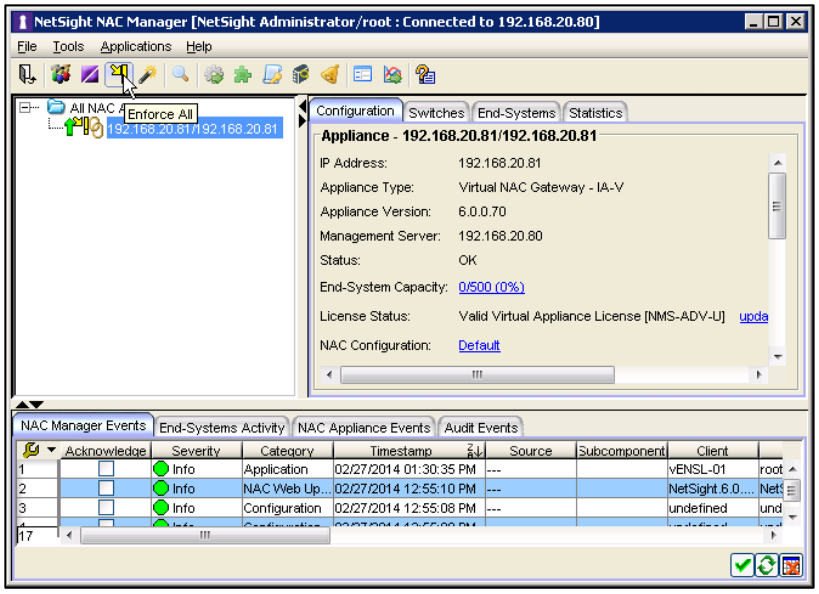
9. Configure authentication rules, conditions, and actions through the “NAC Configuration” link on the **Configuration** tab.


NAC Configuration: Default
Edit NAC Configurations to manage the end user connection experience and control network access based on authentication, time, and location.
Features
Rules
AAA: Default
Portal: Default
An ordered list of Rules used to select a NAC Profile for an end-system based on its criteria.
Enabled
Rule Name
Conditions
Actions
Blacklist
End-System is in Blacklist
Profile: Quarantine NAC Profile
Accept Policy: Quarantine
Portal: Default
User will be redirected to the Blacklist notification ...
MAC Rule All End Systems
Authentication is MAC and
Location is in Hadoop Lab
Profile: Default NAC Profile
Accept Policy: Enterprise User, Default VLAN[1]
Blue-Netlogin-1000 Org
Location is in Netlogin-SW
Profile: All ES Netlogin 1000 Blue
Accept Policy: Netlogin-Blue, Blue[1000]
Blue VLAN 1000 Org
Authentication is MAC and
End-System is in ESG Blue and
Location is in DC Lab
Profile: All VMs Blue 1000
Accept Policy: Blue VLAN 1000, Blue[1000]
Red VLAN 1001 Org
Authentication is MAC and
End-System is in ESG Red and
Location is in DC Lab
Profile: All VMs Red 1001
Accept Policy: Red VLAN 1001, Red[1001]
Default Catchall
catch-all rule
Profile: Default NAC Profile
Accept Policy: Enterprise User, Default VLAN[1]
Save
Close
Help

10. Click the **Enforce All** icon ( ) to open the **NAC Appliance Enforce** window and enforce the policy on all the switches. This will accomplish pushing down the relevant RADIUS configuration on the switch itself to communicate with the NAC.



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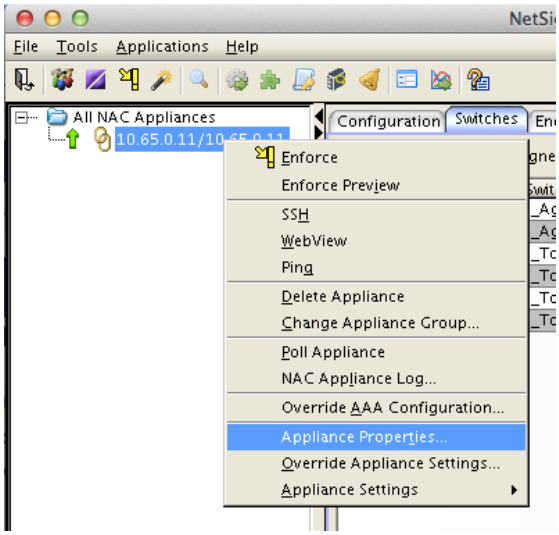
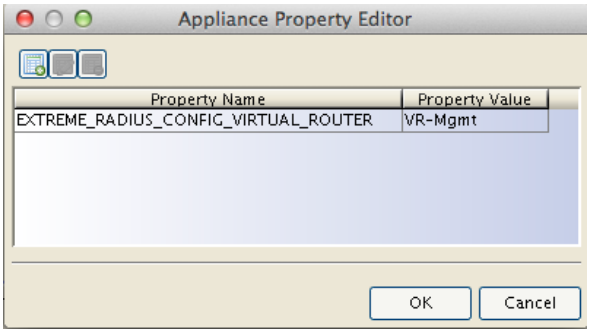
11. By default, NAC assumes that the switch has reachability to it through VR-Default. If this is not the case, for example if the switch has reachability to NAC through VR-Mgmt, then one extra step must be taken before Enforce All: add a NAC property to configure the proper VR.

    Property name: EXTREME_RADIUS_CONFIG_VIRTUAL_ROUTER

    Property value: VR-Mgmt





After Enforce, this is the CLI that now appears on the switch:

configure radius netlogin primary server 10.65.0.11 1812 client-ip 10.65.1.101 vr VR-Mgmt
configure radius netlogin primary shared-secret encrypted
"GXZU^@E[QM@^IM\VFHQGX"
configure radius-accounting netlogin primary server 10.65.0.11 1813 client-ip 10.65.1.101 vr VR-Mgmt
configure radius-accounting netlogin primary shared-secret encrypted
"GXZU^@E[QM@^IM\VFHQGX"
enable radius netlogin
configure radius netlogin timeout 15
enable radius-accounting netlogin
configure radius-accounting netlogin timeout 15

12. With live traffic, end-systems (a.k.a. “clients” or “hosts”) will show in the **End-Systems** tab for switches configured to authenticate with the NAC, for example through NetLogin.

Refer to ExtremeXOS documentation for more details.

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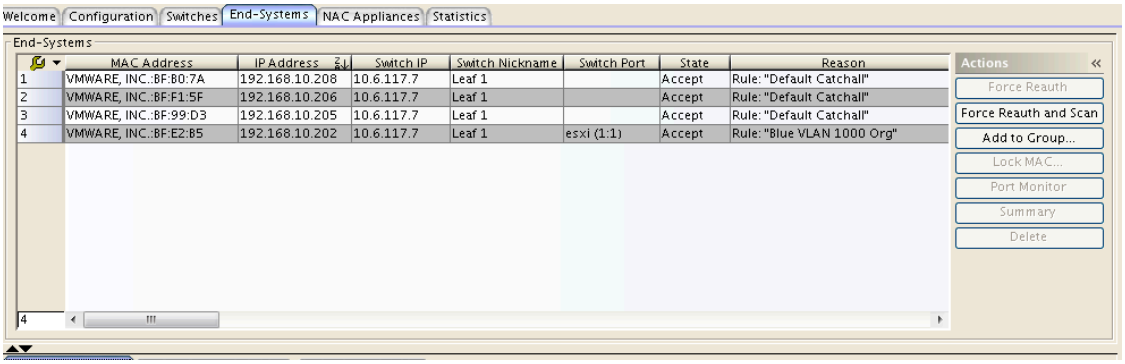


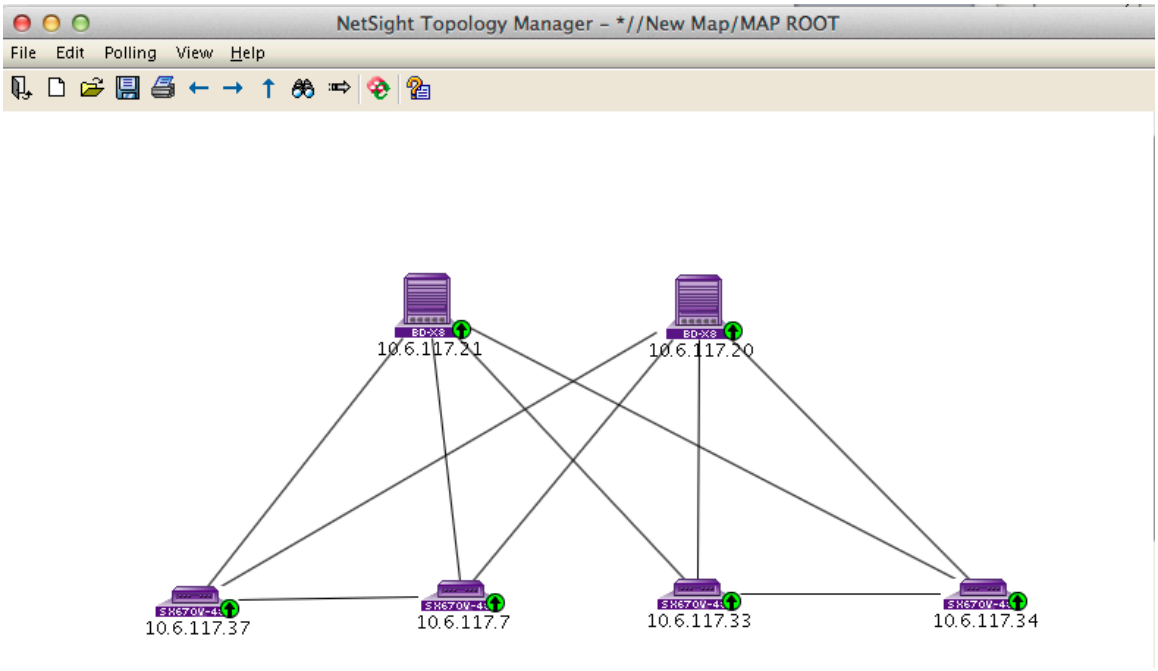
Topology View

The NetSight Topology Map provides an easy way to visualize the network and it provides an automatically generated visual representation of network connectivity. Topology maps provide network administrators with in-depth graphical views of device groupings, device links, VLANs, and Spanning Tree status.

To enable the automated network connectivity discovery, configure LLDP on the switches:

```
enable lldp ports all
configure lldp ports all advertise management-address
```

The following visual was automatically generated from a real network comprising two BlackDiamond X8 as Aggregation switches and four X670 as ToR switches:



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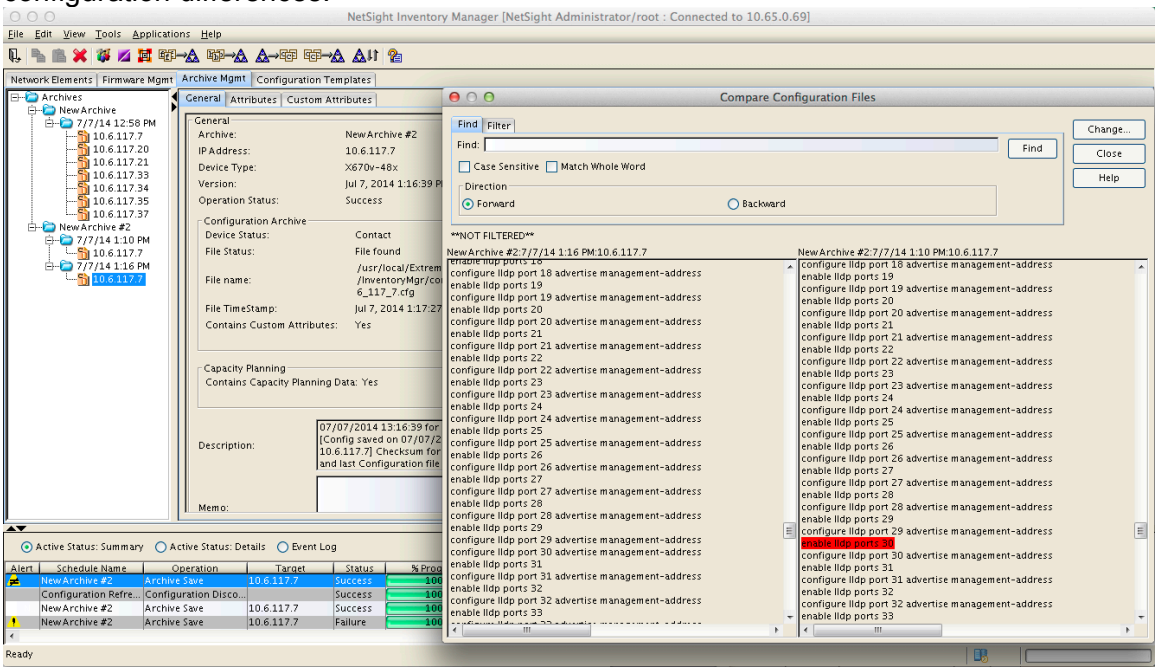
Inventory Manager

Keeping track of configuration, firmware revision level, and capacity planning information can be overwhelming. The NetSight Inventory Manager automates management of device configurations and provides the tools you need to capture, modify, load, and verify configurations for thousands of network devices. Using Inventory Manager you can easily perform device administration on configuration files, schedule firmware updates, archive configuration data, and quickly restore one or multiple devices to a known good state—for Extreme devices and third-party devices.

Powerful wizards simplify firmware and Boot PROM upgrades, configuration file archiving, and device restore. Inventory Manager tracks the movement, addition, and changing of Field Replaceable Units and even identifies unused ports and chassis slots.

The following figure shows NetSight's ability to compare archived configuration files and identify configuration differences.


NetSight Inventory Manager [NetSight Administrator/root : Connected to 10.65.0.69]
File Edit View Tools Applications Help
Network Elements Firmware Mgmt Archive Mgmt Configuration Templates
Archives
New Archive
7/7/14 12:58 PM
10.6.117.7
10.6.117.20
10.6.117.21
10.6.117.33
10.6.117.34
10.6.117.35
10.6.117.37
New Archive #2
7/7/14 1:10 PM
10.6.117.7
7/7/14 1:16 PM
10.6.117.7
General Attributes Custom Attributes
Archive: New Archive #2
IP Address: 10.6.117.7
Device Type: X670v-48x
Version: Jul 7, 2014 1:16:39 P
Operation Status: Success
Configuration Archive
Device Status: Contact
File Status: File found
File name: /usr/local/Extrem /InventoryMgr/co 6_117_7.cfg
File TimeStamp: Jul 7, 2014 1:17:27
Contains Custom Attributes: Yes
Capacity Planning
Contains Capacity Planning Data: Yes
Description:
07/07/2014 13:16:39 for [Config saved on 07/07/2 10.6.117.7] Checksum for and last Configuration file
Memo:
Active Status: Summary
Active Status: Details
Event Log
Alert Schedule Name Operation Target Status % Prog
New Archive #2 Archive Save 10.6.117.7 Success 100
Configuration Refre... Configuration Disco... Success 100
New Archive #2 Archive Save 10.6.117.7 Success 100
New Archive #2 Archive Save 10.6.117.7 Failure 100
Ready
Compare Configuration Files
Find Filter
Find:
Case Sensitive Match Whole Word
Direction
Forward Backward
Find
Change...
Close
Help
NOT FILTERED
New Archive #2:7/7/14 1:16 PM:10.6.117.7
New Archive #2:7/7/14 1:10 PM:10.6.117.7
configure lldp port 18 advertise management-address
enable lldp ports 19
configure lldp port 19 advertise management-address
enable lldp ports 20
configure lldp port 20 advertise management-address
enable lldp ports 21
configure lldp port 21 advertise management-address
enable lldp ports 22
configure lldp port 22 advertise management-address
enable lldp ports 23
configure lldp port 23 advertise management-address
enable lldp ports 24
configure lldp port 24 advertise management-address
enable lldp ports 25
configure lldp port 25 advertise management-address
enable lldp ports 26
configure lldp port 26 advertise management-address
enable lldp ports 27
configure lldp port 27 advertise management-address
enable lldp ports 28
configure lldp port 28 advertise management-address
enable lldp ports 29
configure lldp port 29 advertise management-address
enable lldp ports 30
configure lldp port 30 advertise management-address
enable lldp ports 31
configure lldp port 31 advertise management-address
enable lldp ports 32
configure lldp port 32 advertise management-address
enable lldp ports 33

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Identity Management

The Identity Management (IDM) feature collects user and device data whenever users or devices connect to or disconnect from the switch. The switch works seamlessly with NAC to manage an identity database and respond to all identity event triggers.

The first step is to enable IDM using the commands:

enable identity-management
configure identity-management add ports <ports>

IDM works with a variety of software components like LLDP, Kerberos, NetLogin, FDB, and IP-Security. Since there are such a variety of options, please refer to the ExtremeXOS user guides for details on configuring the software components. The *EXOS IDM and NAC Integration* guide, located on The Hub (login required), may also be helpful.

Revision History

Date	Version	Changes Made
10/7/14	0.9	Initial draft
10/28/14	1.0	Published version
11/5/14	2.0	Completed version

About Extreme Networks

Extreme Networks, Inc. (NASDAQ: EXTR) is setting a new standard for superior customer experience by delivering network-powered innovation and market leading service and support. The company delivers high-performance switching and routing products for data center and core-to-edge networks, wired/wireless LAN access, and unified network management and control. Our award-winning solutions include software-defined networking (SDN), cloud and high-density Wi-Fi, BYOD and enterprise mobility, identity access management and security. Extreme Networks is headquartered in San Jose, CA and has more than 12,000 customers in over 80 countries. For more information, visit Extreme Networks website at http://www.extremenetworks.com

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